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COUNTRY ANALYSIS BRIEFS

Mexico

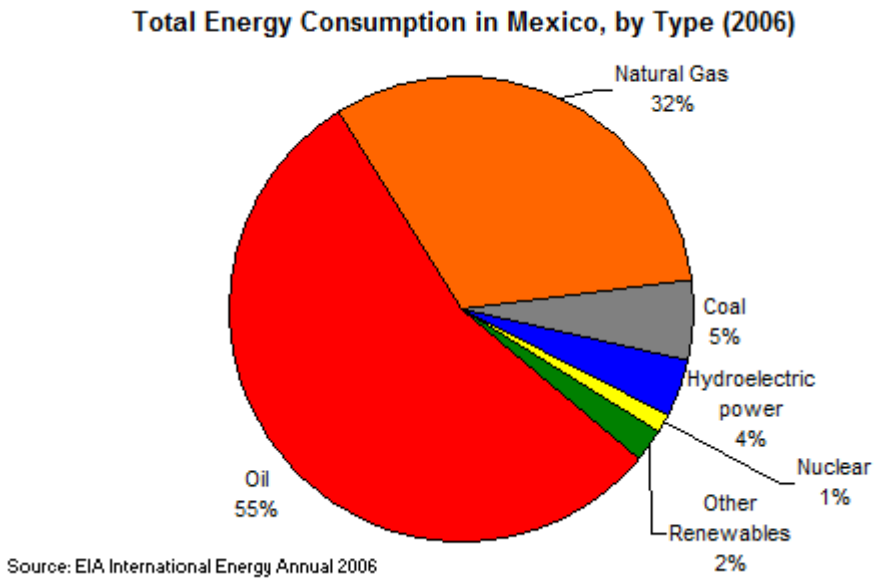
Last Updated: March 2009

Background

Mexico is a major non-OPEC oil producer, with one of the world's largest oil companies, Pemex.

In 2008, Mexico was the seventh-largest oil producer in the world, and the third-largest in the Western Hemisphere. State-owned Petroleos Mexicanos (Pemex) holds a monopoly on oil production in the country and is one of the largest oil companies in the world. However, oil production in the country has begun to decrease, as production at the giant Cantarell field declines. The oil sector is a crucial component of Mexico's economy: while its relative importance to the general Mexican economy has declined, the oil sector still generates over 15 percent of the country's export earnings. More importantly, the government relies upon earnings from the oil industry (including taxes and direct payments from Pemex) for about 40 percent of total government revenues. Therefore, any decline in production at Pemex has a direct effect upon the country's overall fiscal balance.

Mexico's total energy consumption in 2006 consisted mostly of oil (55 percent), followed by natural gas (32 percent). All other fuel types contribute smaller amounts to Mexico's overall energy mix. Natural gas is increasingly replacing oil as a feedstock in power generation. However, Mexico is a net importer of natural gas, so higher levels of natural gas consumption will likely depend upon higher imports from either the United States or via liquefied natural gas (LNG).

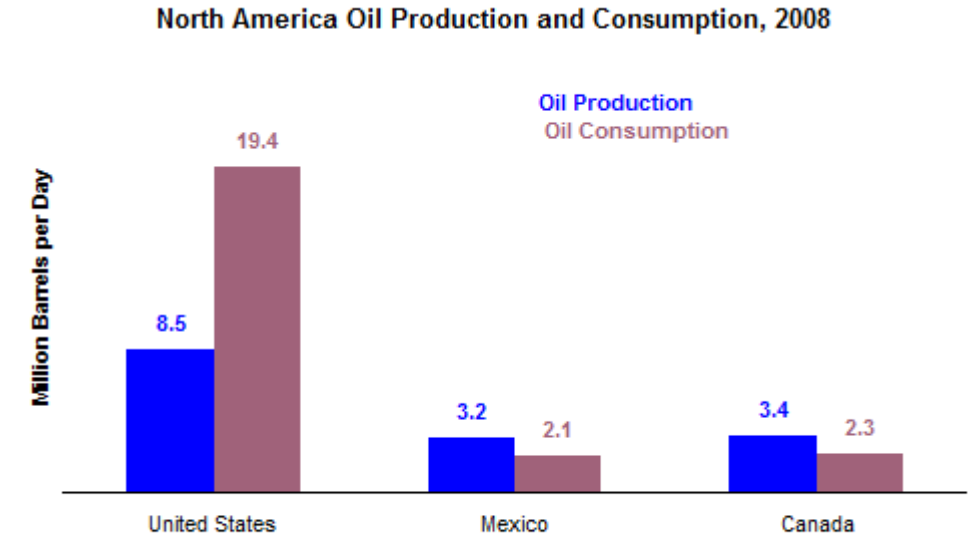


Oil

Mexico is one of the top three sources of U.S. oil imports.

According to the *Oil and Gas Journal* (*OGJ*), Mexico had 10.5 billion barrels of proven oil reserves as of January 1, 2009. Most reserves consist of heavy crude oil varieties, with a specific gravity of less than 25° API. The largest concentration of res erves occurs offshore in the southern part of the country, especially in the CampecheBasin. There are also sizable reserves in Mexico's onshore basins in the northern parts of the country.

In 2008, Mexico was the seventh-largest producer of oil in the world. The country produced an average of 3.19 million barrels per day (bbl/d) of total oil liquids during 2008, down from 3.50 million bbl/d in 2007. Of Mexico's oil production, about 88 percent was crude oil and condensate, the rest consisting of natural gas liquids (NGL) and refinery gain. Many analysts believe that Mexican oil production has peaked, and that the country's production will continue to decline in the coming years. Based on the March 2009 *Short-Term Energy Outlook*, EIA forecasts that Mexico will produce 2.9 million bbl/d of oil in 2009 and 2.7 million bbl/d in 2010. The decline is driven mainly by falling production at the super-giant Cantarell field, which has only been partially offset by higher production from other areas.



Source: EIA *Short-Term Energy Outlook*

Sector Organization

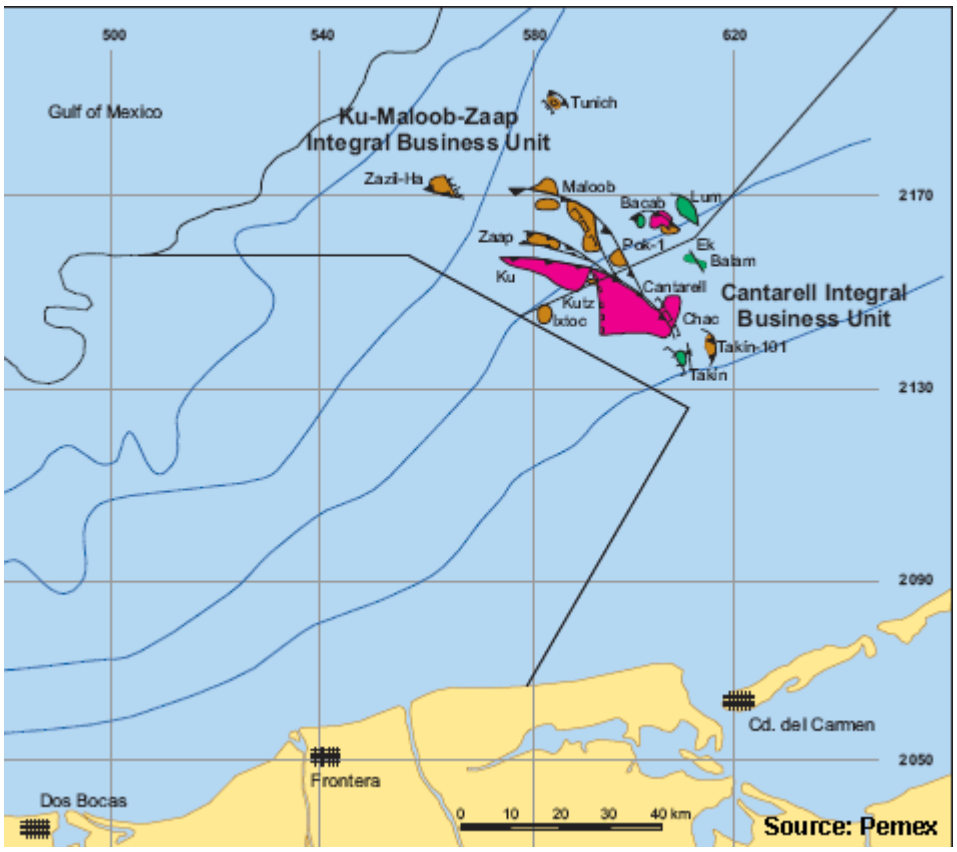
The Mexican constitution provides that the Mexican nation owns all hydrocarbon resources in the country. In 1938, Mexico nationalized its oil sector, creating Pemex as the sole oil operator in the country. Pemex has four operating subsidiaries: Exploration and Production, Gas and Basic Petrochemicals, Petrochemicals, and Refining. Pemex is the largest company in Mexico and one of the largest oil and natural gas companies in the world: in 2008, Pemex earned pre-tax profits of $43 billion, while it paid $50 billion to the government in the form of taxes and other transfers.

In 2008, Mexico enacted new legislation that sought to reform the country's oil sector. The goal of these reforms was to enable Pemex to curb the slide in oil production experienced over the past several years. The measures included several administrative changes, such as adding new seats to Pemex's administrative board for outside industry experts, creating a new advisory board designed to provide independent coordination of long-term energy strategy, and establishing a new hydrocarbons agency to regulate the sector. The reforms would also permit Pemex to create incentive-based service contracts with private companies. Pemex received greater autonomy under the reforms, including the ability to issue its own debt and establish more flexible mechanisms for procurement and investment.

Exploration and Production

Most of Mexico's oil production occurs in the Gulf of Campeche, located off the south-eastern coast of the country in the Gulf of Mexico. The two main production centers in the area include Cantarell and Ku-Maloop-Zaap (KMZ), with smaller volumes also coming from the fields off the coast of Tabasco state. In 2008, the Gulf of Campeche accounted for 80 percent of Mexico's total crude oil production. Due to the concentration of Mexico's oil production in the Gulf of Campeche, any tropical storms or hurricanes passing through the area can disrupt oil operations. In 2007, Hurricane Dean forced the evacuation of all offshore platforms and shut-in all production for several days. In 2005, Hurricane Emily also impacted Pemex's operations in the Gulf.

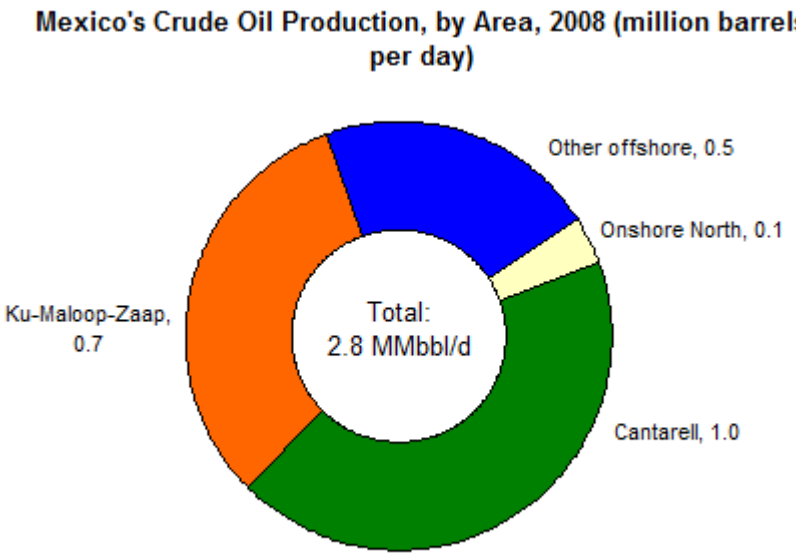
The Cantarell oil field is one of the largest oil fields in the world, but production there has declined dramatically in the past several years. In 2008, Cantarell produced 1.0 million bbl/d of crude oil, down over 30 percent from the 2007 level of 1.47 million bbl/d and down nearly 50 percent from the peak production level of 2.12 million bbl/d in 2004. As production at the field has declined, so has its relative importance to Mexico's oil sector: Cantarell contributed 36 percent of Mexico's total crude oil production in 2008, versus 62 percent in 2004.



Cantarell consists of four major complexes: Akal, Nohoch, Chac, and Kutz. Production at Cantarell began in 1979, but it soon began to decline due to falling reservoir pressure. In 1997, Pemex developed a plan to reverse the field's decline by injecting nitrogen into the reservoir to maintain pressure. The plan was a success, with production at Cantarell in 2004 double the level seen in 1995. However, production at Cantarell soon began to decline again, with the rate of decline accelerating in recent years.

The KMZ project has been the largest source of new production growth in the past few years. Located adjacent to Cantarell, the KMZ complex produced 740,000 bbl/d of crude oil in 2008, up from 550,700 bbl/d in 2007. In just the last three years, production at KMZ has doubled, as Pemex employs a nitrogen re-injection program similar to that used at Cantarell. Production growth at KMZ has partially offset declines seen at Cantarell, and Pemex hopes to increase production further over the next few years. However, industry experts expect production at KMZ to also peak in the medium-term, perhaps as a soon as three years.

The offshore area adjacent to Tabasco state contains the Abkatun-Pol-Chuc and Litoral de Tabasco projects. Each project consists of several smaller fields, with combined crude oil production from the area standing at 500,000 bbl/d in 2008. Production from this area has stabilized in recent years, but it is about one-third lower than levels seen a decade ago.



Onshore fields only represent around 20 percent of Mexico's total crude oil production. Most of this production is in the southern part of the country, which contains 80 percent of total onshore production. The largest oilfield in the south is Puerto Ceiba, which produced about 50,000 bbl/d in 2008, while the largest oilfield in the north is Arenque (10,000 bbl/d in 2008).

Chicontepec

Pemex sees the onshore Chicontepec project, located northeast of Mexico City, as a potentially large source of future production growth. Chicontepec contains 29 distinct fields spread over an area of 2,400 square miles. The project currently produces about 30,000 bbl/d, but Pemex hopes to increase production to 700,000 bbl/d by 2017. In early 2009, Pemex announced a tender for the drilling of 170 development wells at Chicontepec, following earlier tenders in 2008 for the drilling of 1,000 wells. According to Pemex, Chicontepec contains an estimated 17.7 billion barrels of oil equivalent of possible (3P) hydrocarbon reserves.

According to industry reports, Chicontepec is very challenging technically. Most of the crude oil at Chicontepec is very heavy, with an API gravity of as little as 18°. The reservoir is also highly fractured and at low pressure, meaning that recovery rates could be low and Pemex will need a large number of wells to fully exploit the area. The region does not yet have much of the necessarily infrastructure for large-scale oil development, such as pipelines, which must be built amongst a dense, urban population.

Crude Varieties

Most of Mexico's crude oil production consists of heavy crude varieties. Maya, a heavy crude which averages 22° API and 3.5-4.0 percent sulfur c ontent, generally represents around two-thirds of Mexico's total crude oil production. The country also produces two lighter crude streams, Isthmus (34° API) and Olmeca (39° API). In general, Mexico retains most of the lighter crude streams for domestic consumption and exports the bulk of its Maya production to the U.S. Gulf Coast, which has sophisticated refining capacity necessary to process these heavy crudes.

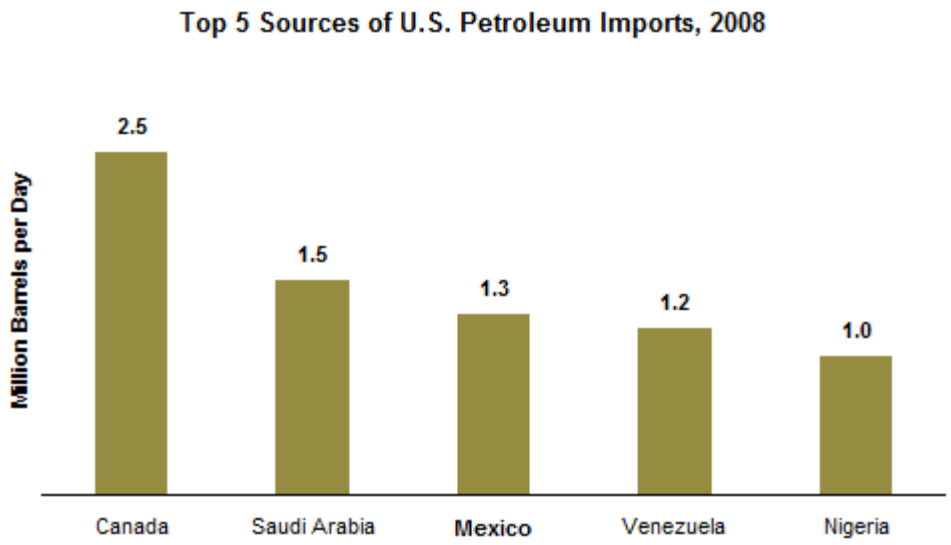
Pipelines

Pemex operates an extensive pipeline network in Mexico that connects major production centers with domestic refineries and export terminals. This network consists of over 453 pipelines spanning 2,900 miles, with the largest concentration occurring in the southern part of the country. Mexico does not have any international pipeline connections, with most exports leaving the country via tanker from three export terminals in the southern part of the country: Cayo Arcas, Dos Bocas, and Coatzacoalcos.

Oil Trade

Oil Exports

In 2008, Mexico exported 1.4 million bbl/d of crude oil. The United States receives the vast majority of Mexico's crude oil exports, which mostly arrive via tanker at the GulfCoast; in 2008, the U.S. imported 1.2 million bbl/d of crude oil from Mexico, of which 97 percent went to the GulfCoast. The U.S. also imported about 100,000 bbl/d of refined products from Mexico in 2008, mostly residual fuel oil, naphtha, and gasoline blending components.



Source: EIA Petroleum Supply Monthly

Mexico is consistently one of the top three exporters of oil to the U.S., along with Canada and Saudi Arabia. The close proximity of the U.S. market and the sophisticated level of refineries in the United Stateswill continue to attract the bulk of Mexico's oil exports. Mexico's crude oil exports to the United States rose steadily through the 1980s and 1990s, before peaking in 2004 at 1.6 million bbl/d. The combination of Mexico's falling oil production and rising domestic demand have led to a reduction in exports to the United States since that peak. From 2004-2007, Mexico was the second-largest source of U.S. oil imports, but fell to third-largest in 2008.

Oil Imports

Despite its status as one of the world's largest crude oil exporters, Mexico is a net importer of refined petroleum products. In 2008, Mexico imported 550,000 bbl/d of refined petroleum products, while exporting 192,000 bbl/d. Gasoline represented over 60 percent of product imports. A resumption of brisk economic growth is one cause for the increase in refined product imports, along with fixed domestic product prices that are below international market levels.

Long-Term Developments in Mexico's Oil Trade

The *International Energy Outlook (IEO) 2009* forecasts that Mexico could become a net oil importer by 2020, with net imports reaching 300,000 bbl/d in 2030. As one of the largest oil exporters to the United States, this has important implications for future U.S. energy supplies. On the other hand, the *Annual Energy Outlook (AEO) 2009* Early Release projects that U.S. crude oil imports could fall from 9.78 million in 2008 to 6.95 million bbl/d in 2030. As a result, the long-term fall in U.S. crude oil imports could be larger than the fall in Mexico's crude oil exports. From Mexico's perspective, changing into a net oil importer would have important repercussions upon the economy, due to the dependence of the federal government on Pemex for a sizable share of its revenues.

Downstream

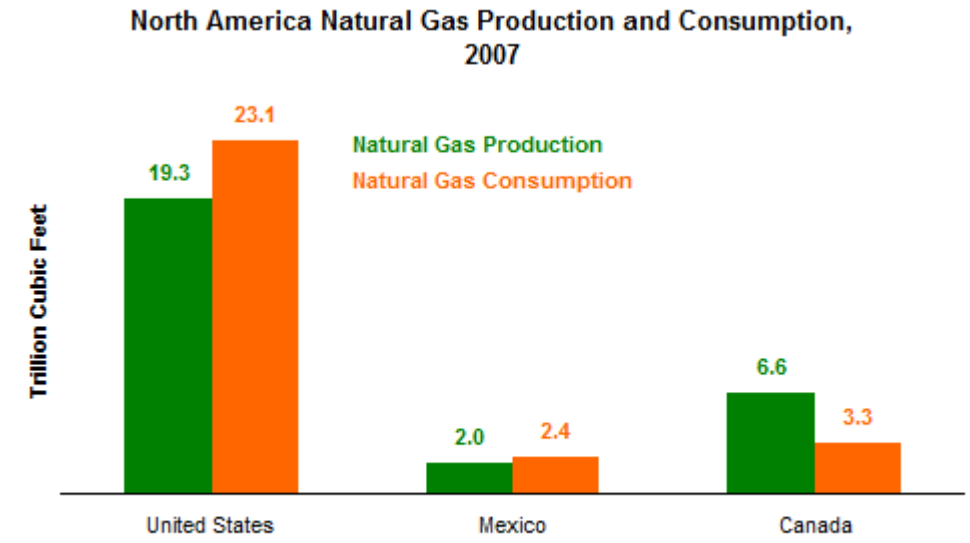
Mexico's oil consumption averaged 2.1 million bbl/d in 2008. According to *OGJ*, Mexico has six refineries, all operated by Pemex, with a total refining capacity of 1.5 million bbl/d. The largest facility in the country is the 330,000-bbl/d Salina Cruz facility. Outside of Mexico, Pemex controls 50 percent of the 334,000-bbl/d Deer Park refinery in Texas. In order to reduce its imports of refined products, Pemex plans to build at least one additional refinery in Mexico. The company announced in early 2009 that the cost of its plans to build a new, 300,000-bbld refinery had

increased to $10 billion. Pemex planned to start construction on the facility, which would have facilities to better process the country's heavy crude oil production, by the end of 2009.

Natural Gas

Mexico's natural gas consumption is rising primarily due to great use in power generation.

According to *OGJ*, Mexico had 11.8 trillion cubic feet (Tcf) of proven natural gas reserves as of January 2009. According to Pemex, the Southern Region of the country contains the largest share of proven reserves. However, the Northern Region will likely be the center of future reserves growth, as it contains almost ten times as much probable and possible natural gas reserves as the Southern Region. In 2007, Mexico produced 1.98 Tcf of natural gas, while consuming 2.4 Tcf, with imports coming both via pipeline from the United States and liquefied natural gas.



Source: EIA Country Energy Profiles

Mexico's natural gas production has grown in recent years, following steady declines during the late 1990s. During that time, natural gas consumption has grown steadily, driven mostly by the electricity sector, whose share of total natural gas consumption increased from 16 percent in 1997 to 33 percent in 2007. Pemex itself is the single largest consumer of natural gas, representing around 40 percent of domestic consumption in 2007.

Sector Organization

Pemex holds a monopoly on natural gas exploration and production in Mexico. The Mexican government opened the downstream natural gas sector to private operators in 1995, though no single company may participate in more than one industry function (transportation, storage, or distribution). It also created the Energy Regulatory Commission (CRE) to monitor the sector.

Mexico's natural gas production is spread throughout the country. Onshore fields in the northern part of the country represented 42 percent of Mexico's natural gas production in 2007, while onshore fields in the south contributed 22 percent, and offshore fields in the Gulf of Campeche represented the remainder. Mexico's natural gas production is relatively-evenly split between associated and non-associated fields.

Pipelines and Storage

Pemex operates over 5,700 miles of natural gas pipelines in Mexico. The company has twelve natural gas processing centers, which produced 400,000 bbl/d of natural gas liquids (NGLs) and 200,000 bbl/d of liquefied petroleum gas (LPG) in 2007. Pemex also operates most of the country's natural gas distribution network, which supplies processed natural gas to consumption centers. The natural gas pipeline network includes ten active import connections with the United States. In 2008, Mexico imported 363.3 billion cubic feet (Bcf) of natural gas from the United States, while it also exported 42.9 Bcf.

Liquefied Natural Gas (LNG)

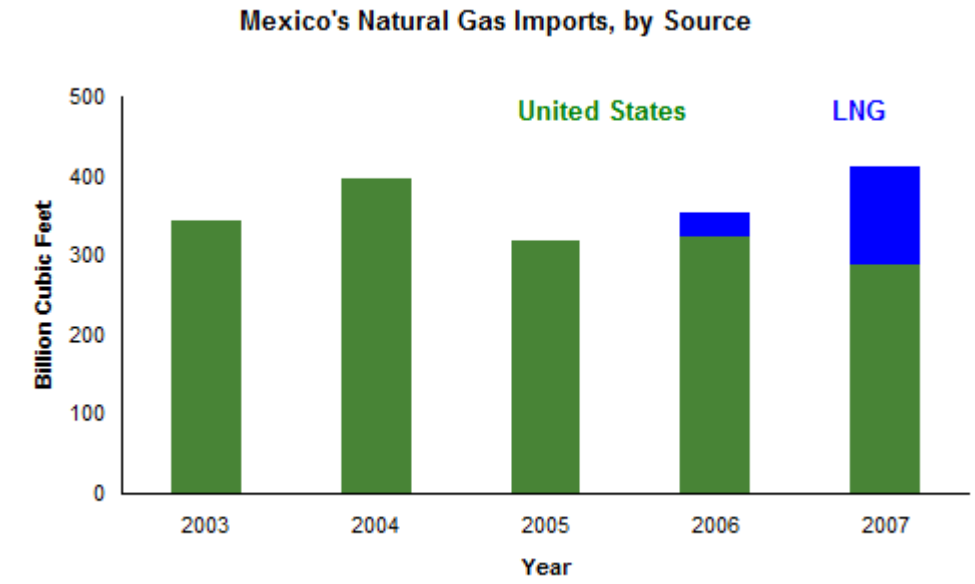
There are two operating LNG terminals in Mexico and one other currently under construction. In addition, there are other plants in various stages of the planning process. According to industry reports, the largest suppliers of LNG to Mexico in 2007 were Egypt, Nigeria, and Trinidad and Tobago.

East Coast

Altamira, a joint venture of Royal Dutch Shell (50 percent), Total (25 percent), and Mitsui (25 percent) received its first LNG cargo in August 2006. The plant, located in Tamaulipas state, has an initial capacity of 500 million cubic feet per day (MMcf/d), with plans to increase the project to a peak capacity of 1.3 Bcf/d. CFE has signed a 15-year contract to purchase the entire output of the terminal.

West Coast

The Costa Azul terminal near Ensenada, operated by Sempra, began receiving LNG in 2008. The current send-out capacity of the plant is about 1 Bcf/d. Most of the natural gas will supply domestic customers in northwest Mexico, but some natural gas could also be exported to California or Arizona.



Source: International Energy Agency

Construction of a new LNG terminal at the port of Manzanillo began in 2008. The plant will have an initial capacity of 500 MMcf/d. A consortium of Mitsui, KOGAS, and Samsung is building the plant. The plant would be the second LNG terminal on the Pacific Coast.

In May 2004, DKRW signed an agreement with the state government of Sonora to build a 1.0-Bcf/d LNG receiving terminal at Puerto Libertad, on the Gulf of California. El Paso later joined the project as well, and the project will reportedly connect with the El Paso natural gas pipeline system in the United States. According to project sponsors, the plant could begin operations by 2011.

Electricity

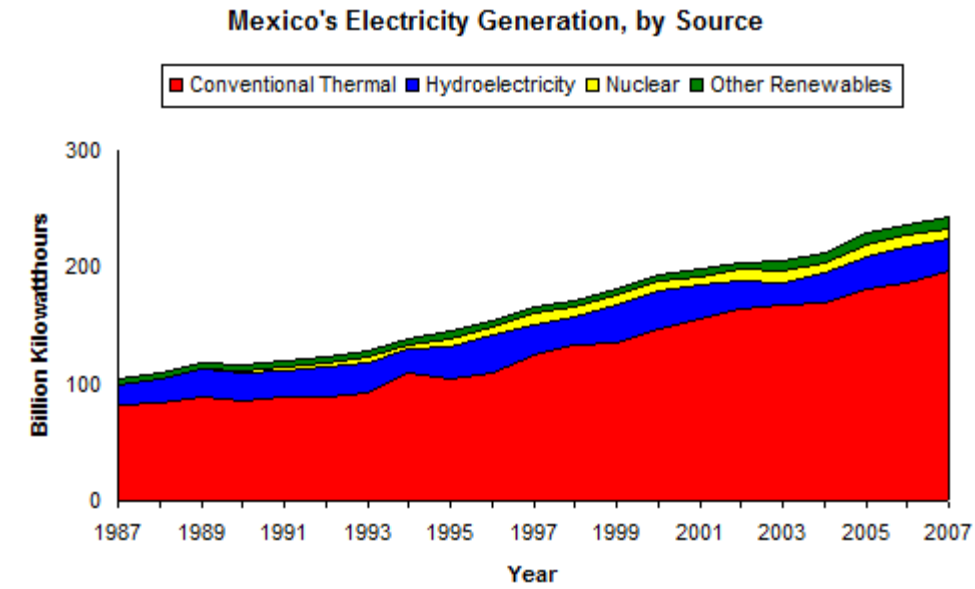
Most of Mexico's electricity generation comes from conventional thermal sources, chiefly natural gas.

Mexico had 53.8 gigawatts of installed electricity generating capacity in 2007. The country generated 243 billion kilowatthours (Bkwh) of electric power in 2007. Conventional thermal generation represents the overwhelming majority of Mexico's electricity generation, though the mix from these sources is gradually shifting from oil products to natural gas. Mexico consumed 202 Bkwh of electric power in 2007.

Sector Organization

State-owned Comision Federal de Electricidad (CFE) is the dominant player in the generation

sector, controlling about two-thirds of installed generating capacity. CFE also holds a monopoly on electricity transmission and distribution outside of Mexico City and some other municipalities; within those areas, state-owned Luz y Fuerza Centro (LFC) holds a monopoly on distribution activities. The Comision Reguladora de Energia (CRE) has principle regulatory oversight of the electricity sector.

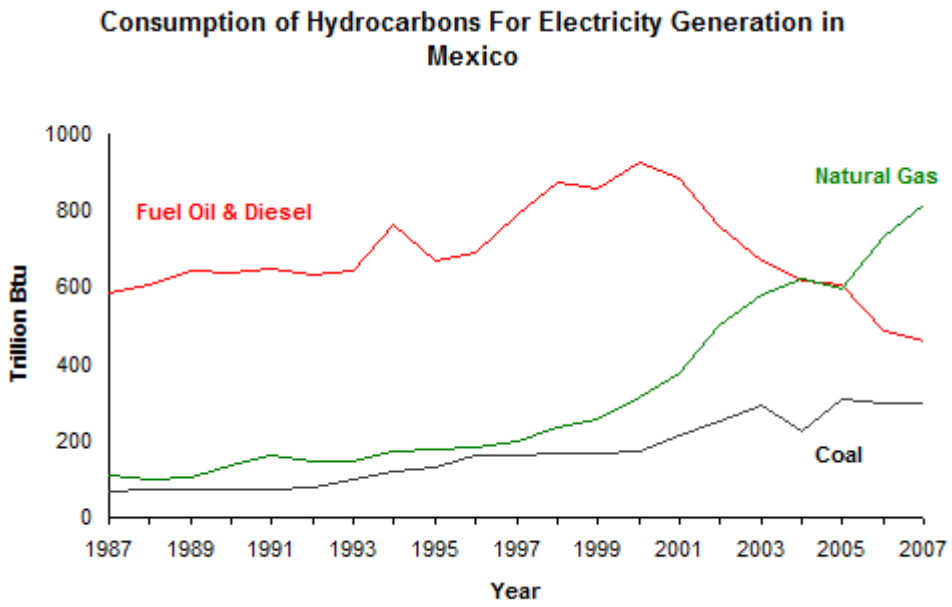


Source: EIA International Energy Annual

Changes to Mexican law in 1992 opened the generation sector to private participation. Any company seeking to establish private electricity generating capacity or begin importing/exporting electric power must attain a permit from CRE. As of the end of 2008, private generators held about 22,700 megawatts (MW) of generating capacity, mostly consisting of combined-cycle, gas-fired turbines (CCGFT). CFE also operates Mexico's national transmission grid, which consists of 27,000 miles of high voltage lines, 28,000 miles of medium voltage lines, and 370,000 miles of low voltage distribution lines.

Conventional Thermal

In the past, fuel oil and diesel fuel represented the largest share of the feedstock in Mexico's conventional thermal generation mix. However, natural gas consumption for electricity generation has risen dramatically in recent years, and natural gas is now the dominant feedstock: according to Mexico's Energy Secretariat (Sener), Mexico consumed 820 trillion Btu of natural gas for electricity generation in 2007, versus 460 trillion Btu of petroleum products. This shift has been the principle driver behind Mexico's rising natural gas consumption. Coal consumption by the electricity sector has also risen in recent years, reaching 300 trillion Btu in 2007.



Source: Sener Balance Nacional de Energia

Other Sources

Mexico has a single nuclear power plant, the 1,400-MW Laguna Verde nuclear reactor in Veracruz, operated by CFE. In April 2007, CFE awarded a contract to an international consortium headed by Alstom to modernize the plant and increase generating capacity by 20 percent. Hydroelectricity supplied about 10 percent of Mexico's electricity generation in 2007. The largest plant in the country is the 2,400-MW Manuel Moreno Torres in Chiapas. According to Sener, Mexico had 1,045 MW of installed, non-hydro renewables, including 85 MW of wind and 960 MW of geothermal.

International Trade

Mexico has an active electricity trade with the United States. Mexico exported 1.3 Bkwh of electricity to the United States in 2007, while importing 0.6 Bkwh. Companies have built power plants near the U.S.-Mexico border with the aim of exporting generation to the United States. There are plans to connect Mexico with Guatemala and Belize as part of the Sistema de Interconexion Electrica para America Central (SIEPAC). The plan is part of a larger effort, the Plan Puebla-Panama, to create an integrated electric power market in Central America. According to media reports, the section of SIEPAC linking Mexico and Guatemala is expected to come online in 2009.

Quick Facts

Energy Overview

Proven Oil Reserves (January 1, 2009E)	10.5 billion barrels
Oil Production (2008E)	3,190 thousand barrels per day, of which 88% was crude oil.
Oil Consumption (2008E)	2,100 thousand barrels per day
Crude Oil Distillation Capacity (2008E)	1,540 thousand barrels per day
Proven Natural Gas Reserves (January 1, 2009E)	11.8 trillion cubic feet
Natural Gas Production (2007E)	1.98 trillion cubic feet
Natural Gas Consumption (2007E)	2.4 trillion cubic feet
Recoverable Coal Reserves (2005E)	1,335 million short tons
Coal Production (2007E)	11.6 million short tons
Coal Consumption (2006E)	18.6 million short tons

Electricity Installed Capacity (2007E)	53.8 gigawatts
Electricity Production (2007E)	243 billion kilowatt hours
Electricity Consumption (2007E)	202 billion kilowatt hours
Total Energy Consumption (2006E)	7.4 quadrillion Btus*
Total Per Capita Energy Consumption (2006E)	68.5 million Btus
Energy Intensity (2006E)	6,116 Btu per $2000-PPP**

Environmental Overview

Energy-Related Carbon Dioxide Emissions (2006E)	436 million metric tons
Per-Capita, Energy-Related Carbon Dioxide Emissions (2006E)	4.1 metric tons
Carbon Dioxide Intensity (2006E)	0.36 metric tons per thousand $2000-PPP**

Oil and Gas Industry

Organization	Petroleos Mexicanos (Pemex), state-owned oil and natural gas monopoly
Major Oil/Gas Ports	Cayo Arcas, Dos Bocas, and Coatzacoalcos
Foreign Company Involvement	Some service contracts. Foreign companies are also involved in the midstream natural gas sector.
Major Oil Fields	Cantarell, Ku-Maloop Zaap, Abkatun-Pol-Chuc
Major Natural Gas Fields	Cantarell, Caan, Culebra, Muspac
Major Refineries (capacity, bbl/d)	Salina Cruz (330,000), Ciudad Madero (190,000), Tula Hidalgo (315 ,000), Cadereyta (275,000), Salamanca (245,000), Minatitlan (185 ,000)

* The total energy consumption statistic includes petroleum, dry natural gas, coal, net hydro, nuclear, geothermal, solar, wind, wood and waste electric power.
**GDP figures from Global Insight estimates based on purchasing power parity (PPP) exchange rates.

Links

EIA Links
EIA - Mexico Country Energy Profile

U.S. Government
CIA World Factbook - Mexico
U.S. State Department's Consular Information Sheet - Mexico

Foreign Government Agencies
Comisión Reguladora de Energía (CRE)
Secretaría de Comunicaciones y Transportes (SCT)
Secretaría de Energía
Secretaría de Medio Ambiente y Recursos Naturales (Semarnat)

Oil and Natural Gas
PEMEX, the state-owned oil company of Mexico

Electricity
Comisión Federal de Electricidad
Luz y Fuerza del Centro

Sources

Business Latin America Select
Business News Americas
Cambridge Energy Research Associates
ChevronTexaco
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CIA World Factbook

Comisión Federal de Electricidad
Dallas Morning News
Deutsche Bank
Dow Jones
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Electric Utility Week
Energy Compass
Financial Times
Foreign Policy in Focus
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Los Angeles Times
Marathon Oil Corporation
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